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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/500,432	12/02/2004	Ajay P. Malshe	ARK007-144/011144	9326
24118 7590 02/20/2007 HEAD, JOHNSON & KACHIGIAN 228 W 17TH PLACE TULSA, OK 74119			EXAMINER CADUGAN, ERICA E	
			ART UNIT	PAPER NUMBER
			3722	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/20/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/500,432

Applicant(s)

MALSHE ET AL.

Examiner

Erica E. Cadugan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s), _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 6/28/2004.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application
- ☐ Other: _____.

DETAILED ACTION***Drawings***

1. It appears that Figures 1-3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated (see especially page 16, lines 5-6, 13-14, 20-21, and page 17, lines 2-3, for example). See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "micro-scale steam engine", the "piezoelectric mechanism", the "piezoresistive mechanism", and the "thermal actuator" of claim 2; the "miller" (claims 3 and 13), the "stamp" (claims 3 and 13), the "heater", "the evaporator", all of claim 3; the rotary "pen" of claims 3 and 13 {note that claim 1 (and claim 12) sets forth that the nanotool rotates, and that claim 3 (and claim 13) further sets forth that the tool is a pen, and that even though Figure 8 is described in the specification as showing a "pen or deposition nanotool 130" (page 18), it does not appear that the pen or deposition nanotool 130 of Figure 8 is rotary; instead, the pen is non-rotating, and the rotation of the microgear is used to rotate a pumping device to pump the deposition material down the channel 132 (see top of page 19)}; the rotary "hole puncher" of claims 3 and 13 {again note that claim 1 (and claim 12) sets forth that the nanotool rotates, and that claim 3 (and claim 13) further sets forth that the tool is a "hole

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puncher”, and that even through Figure 9 is described as showing a nanotool 142, the specification explicitly teaches that if the nanotool of Figure 9 is used as a hole puncher, then “rotational motion is not required” (see page 19, lines 13-14, for example)); re claim 4, it does not appear that all of the alternatives (tool formed by each of “a focused ion beam”, “photolithography”, or “laser”) are shown in the figures; re claim 5, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

The specification does not appear to provide antecedent basis for the micromotor being powered by any of a “piezoelectric mechanism”, a “piezoresistive mechanism”, or a “thermal actuator” as set forth in claim 2. Particularly regarding the “thermal actuator”, it is noted that paragraph 0021 mentions thermal actuators in a very general sense, but does not teach that such is used to rotate a load gear and a nanotool as set forth in the claims.

The specification also does not appear to provide antecedent basis for any rotary “stamp” as set forth in claims 3 and 13, any rotary “pen” as set forth in claims 3 and 13 (again, as noted above, the specification appears to teach that the pumping device for a deposition device is rotary, but does not appear to teach a rotary pen); a rotary “heater” (claim 3), and a rotary “evaporator” (claim 3), or any rotary “hole puncher” as set forth in claims 3 and 13 (again noting that the specification explicitly teaches that if the tool is used as a hole puncher, it is non-rotating).

Additionally, re claim 4, while the specification does teach that the use of photolithography, per se, is known, the specification does not appear to provide antecedent basis for a rotary nanotool that is formed by application of photolithography as specifically set forth in claim 4.

Re claim 5, it is noted that the paragraph spanning pages 20-21 teaches that “[A]lloys of titanium and nickel, diamond like carbon and nano crystalline diamond are all good coating

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materials” and that “[G]allium Arsenide is another desirable coating material”, and that “[A] variety of other materials suitable for forming the frame and for coating are well know (sic) to those skilled in the art”. However, the specification as originally filed does not appear to provide antecedent basis for a coating of “metals, ceramics, polymers, liquids, composites”, “polyamides, silicon or multilayered titanium nitride and titanium aluminum nitride” as set forth in claim 5.

Re claim 10, it does not appear that the specification as originally filed provides antecedent basis for the specifically-claimed range of the nanotool being “less than one micrometer wide”.

Claim Objections

4. Claim 14 is objected to because of the following informalities: in line 4, it appears that “rotatable” should be --rotatably--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-14 are replete with instances that do not particularly point out and distinctly claim the subject matter of applicant’s invention. Examples of these instances are listed below, but these instances are not limited to the listed examples. Applicant is advised to closely review the claims for other occurrences.

There are several positively recited limitations that lack sufficient antecedent bases in the claims. An example of this is: “said micro-gear” in at least claim 1, line 4. This is not meant to be an all-inclusive list of such occurrences. Applicant is required to review the claims and correct any other such occurrences of limitations lacking sufficient antecedent basis.

In claim 5, it is unclear precisely what combination of materials are being claimed, noting that the last line of the claim sets forth “or”, and “and” in a list. It is thus unclear if, to meet the present language of claim 5, a reference must teach only one of the listed elements, or if it must teach more than one (and if it must teach more than one, it is unclear which combination must be taught for the claim language to be met).

In claim 6, it is unclear what is encompassed by “like” in the term “diamond like” carbon.

Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term “machining” in claims 3 and 13 is used by the claim to include non-material removal or finishing operations of stamping, writing (via the claimed “pen”), and heating or evaporating, while the accepted meaning generally applies to material removal and finishing processing operations. The term is indefinite because the specification does not clearly redefine the term.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-4 and 10-14, as best understood, are rejected under 35 U.S.C. 103(a) as being obvious over U.S. Pat. No. 5,631,514 to Garcia et al.

Garcia teaches a device including a rotatable load “micro” (see col. 8, lines 60-62, for example) gear 17 (Figure 3) or 31 (Figure 4), a “micro-motor” powered by a linear electrostatic comb actuator (re claim 2) or a piezoelectric actuator (re claim 2), for example (see col. 3, line 33 through col. 4, line 24, for example, and at least Figures 3-4).

Note that the micro-engine engages and rotates the load gear 17 or 31 (Figures 3, 4, col. 3, line 33 through at least col. 4, line 45), which rotates a micromechanism (col. 7, lines 58-62), which micromechanism can be a “machining” tool (see col. 7, lines 25-35).

Re claim 3, note that use of a rotary (noting that Garcia explicitly teaches that the microengine provides rotary output directly to the micromechanism in at least col. 1, lines 25-30, col. 2, lines 1-15, and col. 7, lines 57-62, for example) cutting tool (col. 7, lines 24-30) pumping mechanism (col. 7, lines 29-30, for example, akin to the description in the present specification of how the deposition tool or pen pumping device is driven). Re the cutting tool, it is noted that if the tool is a rotary tool, it must inherently be able, to at least a limited extent, perform at least one of a deburring, drilling, or milling operation, noting that even a rotary saw blade can perform deburring if applied to a workpiece such that it cuts away a burred portion thereof, and thus, Garcia teaches at least one of the tools set forth in claim 3.

Re claim 4, it is noted that claim 4 is a product-by-process claim. While Garcia is silent as to the specific method by which the tools described in col. 7, lines 25-35, are produced, the

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tools nevertheless appear to be structurally the same as the claimed tool produced by one of “a focused ion beam, photolithography, or laser”. See MPEP section 2113.

Re claim 12, it is noted that the tool described by Garcia is at least functionally “attached” to the load gear.

Re claim 14, it is noted that the tool is functionally engaged “on” at least the teeth of the gear.

Re claim 1, while Garcia does explicitly teach the “machining” tool described previously, and does teach that such tool is “micro-sized” (col. 7, lines 24-35), Garcia is silent as to the specific dimensions of the tool, and thus does not explicitly teach that the tool is a “nano” tool.

Similarly, re claims 10-11, while Garcia does explicitly teach the “machining” tool described previously, and does teach that such tool is “micro-sized” (col. 7, lines 24-35), Garcia is silent as to the specific dimensions of the tool, and thus does not explicitly teach that the tool is in the claimed ranges of “less than one micrometer wide” (claim 10) and “less than 100 nanometers wide” (claim 11).

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have made the micro-sized tool taught by Garcia whatever size or range of sizes was desired or expedient, so long as it maintained its small “micro” (as opposed to “macro”) size, including being in the “nano” size range (re claim 1), being less than one micrometer wide (re claim 10), or being less than 100 nanometers wide (re claim 11), particularly since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

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Re claim 4, in the alternative, it is noted that Garcia does not explicitly teach that the tool is produced by one of “a focused ion beam, photolithography, or laser”. However, Examiner takes Official Notice that these are well-known manufacturing techniques, and thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilized one of these well-known manufacturing techniques to have produced one of the tools taught by Garcia for the purpose of providing a tool made with a well-known method, which would thus have known properties of use therefor, and thus for which little troubleshooting would be required. See MPEP section 2113 re Product-By-Process claims.

9. Claim 5, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 5,631,514 to Garcia et al. as applied to claim 1 above, and further in view of U.S. pat. No. 6,159,909 to Konig, for example.

Garcia et al. teaches all aspects of the presently-claimed invention as set forth above. It is noted that Garcia teaches that the tool can be a generic “cutting” tool or a generic “material removal tool”, but is silent as to the specific details of such a cutting tool, and thus does not explicitly teach that the tool is coated, or that the coating is one of the materials set forth in claim 5.

However, Konig teaches that it is known in the art that the wear characteristics of cutting inserts used for a variety of “cutting” or “material removal” operations (such as turning, milling, boring, thread cutting and reaming operations, see col. 1, lines 9-19, for example) can be improved by providing a coating such as a ceramic coating (col. 1, lines 9-19, for example).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have substituted a “milling” cutter having a “ceramic” coating thereon

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as taught by Konig for either of the generic “cutting” or “material removal” tools taught by Garcia, for the purpose of providing a cutting tool having improved wear characteristics (re the coating) as explicitly taught by Konig (col. 1, lines 9-19) and for providing a specific market for Garcia’s device (by substituting the specific “milling” tool taught by Konig for either of the generic “cutting” or “material removal” tools taught by Garcia), thus enabling Garcia to provide targeted marketing efforts to sell their product.

10. Claims 6-9, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 5,631,514 to Garcia et al. as applied to claim 1 above.

Garcia et al. teaches all aspects of the presently-claimed invention as set forth above, but is silent as to the material and specific structure of the tools used, and does not specify what material or coatings make up the generic “material removal” or “cutting” tools.

However, re claim 6, Examiner takes Official Notice that cutting or material removal tools coated with “diamond-like carbon” (a.k.a. DLC) are well-known in the art, and that such coatings are well-known to improve wear properties of the tool.

Re claim 7, Examiner takes Official Notice that cutting or material removal tools coated with nano crystalline diamond are well-known in the art, and that such coatings are well-known to improve wear properties of the tool.

Re claims 8-9, Examiner takes Official notice that tools including silicon, and re claim 9, also including at least one of gallium or indium are well-known in the machine tool art, and one material versus another material for a cutting or material removal tool is selected depending on specific requirements of the cutting operation.

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Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilized a cutting tool coated with any of DLC (re claim 6) or nano-crystalline diamond (re claim 7), as are well-known in the art, with the cutting or material removal tool taught by Garcia, for the purpose of improving the wear characteristics of Garcia's tool(s).

Re claims 8-9, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have made the generic cutting or material removal tool taught by Garcia out of whatever known material or materials, including silicon (claim 8) and at least one of indium or gallium (claim 9), depending upon the machining requirements of the end user, noting also that it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. See also Ballas Liquidating Co. v. Allied industries of Kansas, Inc. (DC Kans) 205 USPQ 331.

Conclusion

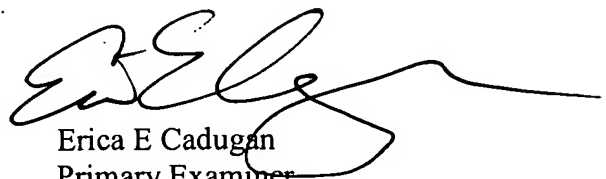
11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erica E. Cadugan whose telephone number is (571) 272-4474. The examiner can normally be reached on M-F, 6:30 a.m. to 4:00 p.m., alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Monica S. Carter can be reached on (571) 272-4475. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Erica E Cadugan
Primary Examiner
Art Unit 3722

eec

February 15, 2007